

Report on December 2003 Low Impact Development

Workshops Jointly Sponsored by

**The Virginia Department of Environmental
Quality**

**The Virginia Department of Conservation and
Recreation**

The Chesapeake Bay Local Assistance Department

Norfolk District, Corps of Engineers

January 2004

Summary of the Comments Received at the December 2003 Low Impact Development (LID) Workshops

In early December 2003, the Virginia Department of Environmental Quality, the Virginia Department of Conservation and Recreation, the Chesapeake Bay Local Assistance Department, and the Norfolk District, Corps of Engineers held five workshops throughout the Commonwealth. The purpose of the workshops was to introduce the basic principles associated with LID and to obtain comments from the public on how LID should be considered in the review of development projects.

The following number of people attended the various meetings:

Richmond	58
Fairfax	167
Chesapeake	45
Charlottesville	50
Roanoke	70

Please find below a list of the comments made at each of the workshops along with the number of “votes” each comment received. (The comments with zero votes were identified during the breakout sessions, but did not receive any votes). These comments will be used by the aforementioned agencies to develop guidance on how LID should be considered in the review of development projects. This report has been posted on the web site of each agency at

Norfolk District, Corps of Engineers www.nao.usace.army.mil
Virginia Department of Environmental Quality www.deq.state.va.us
Virginia Department of Conservation and Recreation www.dcr.state.va.us
Chesapeake Bay Local Assistance Department www.cblad.state.va.us

Our LID workgroup has scheduled its next meeting for February 18th. This group is mainly composed of local, state, and federal agencies. To insure this group includes representation from all stakeholders, we have invited participation from the Virginia Chapter of the American Society of Civil Engineers, the Virginia Chapter of the American Society of Landscape Architects, Northern Virginia Chapter of the National Association of Industrial and Office Parks, Virginia Association of Commercial Real Estate, the Engineers and Surveyors Institute, the Virginia Chapter of the Home Builders Association of Virginia, and the Chesapeake Bay Foundation. At that meeting, the results from the workshops will be discussed and action plan developed that will outline our next planned steps. This action plan, once finalized, will also be posted on each agency’s web site. We anticipate providing additional public involvement opportunities as we prepare guidance on how LID will be considered in the review of development projects impacting waters and wetlands.

If you have any questions about this report, you may contact Bruce Williams at 757.441.7418 or email him at bruce.f.williams@usace.army.mil.

48-Technical Issues/Guidance: More research is needed on pest animals and disease vectors on population increase in LID areas. Standing water/West Nile. Large, established ponds have predators for mosquitoes. Increase in soil moisture content conflicts with site improvements (curb and gutter). Specific materials, methods, and specifications for LID implementation. Technical guidance for LID. How to do it and efficiency (quantity vs. quality). LID is a tool. Need a manual to tell how to use it. Guidelines for technical criteria and construction process. Understanding of flood control and storm events as most sites are hybrid. More technical guidance on hydraulic factors. More detailed technical guidance and regional and local details. LID should be used as a tool not the sole design. Problem soils- easily misapplied techniques as LID won't work everywhere. Topographic/geographic/soil limitations. LID can't handle flood control as well. Encourage use of hybrid approaches and reduce the scale of wet ponds.

39- Mitigation Credit: Corps and DEQ must give mitigation credit. Need to translate the inclusion of LID practices into credits for streams or wetland impacts by local, state and federal agencies. LID is part of the avoidance and minimization to reduce impacts. Ratio buy down for credit purchase must be well defined. Ratio of buffers to buy down. Acres of buffers needed. Must address no net loss without reducing yield. Carrot or stick. Regulatory agencies- allowing LID as compensatory mitigation is carrot to start rest of process. Guidance needed so it can't be used as a stick. Buy down the number of required credits. State level incentives are needed for localities to implement LID. Develop local Trade Marketing and use the extra capacity to sell (incentive). Crediting of LID practices and standardization with local/state and federal agencies. How to best develop incentives for retrofit or new developments.

36- Changes to local codes and ordinances: Implementation problems at the local level. Design review and education of reviewers. Building inspection-proper instructions. Need funding to train and for inspections. Local incentive to use LID to reduce need for regional ponds if no additional cost for enforcement and maintenance. Monetary incentives for LID (from locality, etc.). Reduce stormwater fees and fees associated with proffers. Implementing LID with existing local ordinances will be difficult (e.g., road design and curb and gutter and the 100-year storm issue. Without local government backing, LID can't be implemented. Determination by locality where suitable LID areas are at comprehensive plan development. Problem- no funding for people. Design criteria to be marketable and able to be approved by locality. Change need in local ordinances. Options available. Will zoning ordinance changes be needed to help implement LID? Localities should designate certain staff to review LID projects.

29-General Comments: LID may be more conducive and manageable on large commercial developments vs. residential developments. Consistency between site and environmental planning. Define ultimate stormwater management/watershed goal (pristine vs. developed) or restoration vs. preserving present condition. Resources required for design/review/construction/inspection/maintenance. LID uses biological process vs. a pond. LID changes people's views for landscape aesthetics. LID can

remove pollutants and protect water quality. Use of LID should expedite review time. LID will eliminate wet ponds and reduce West Nile Virus. LID forces a comprehensive site analysis and more thought. Use wasted area (e.g., parking island areas). Subdivision time line issues. Stabilization problems work against LID use.

23- Design/Maintenance/Enforcement Issues: Legal maintenance mechanisms. Need mechanism to maintain and enforce maintenance. Who will enforce and need to address lack of staffing. Corps doesn't want to enforcement on LID. Who will help monitor and maintain LID practices through covenants of homeowners association? Concerns over local burden to ensure BMP inspection/maintenance/functionality. Concerns over design and construction/maintenance and construction management/implementation. LID may create burden on property owner for maintenance. Maintenance and monitoring issues and enforcement. Who's responsible- locality or homeowner and the associated personal property issues.

14-Education: Concerns over education. Need contractor and inspector training. Need to educate plan reviewers.

13- Coordination: Better coordination and flexibility among agencies. Promote early coordination with developers and agencies. Better guidance for agencies to facilitate more predictability. Need across the board guidance for the entire state by DEQ, Corps, and DCR. Consistency from all agencies in review for credits (mitigation).

6-Demonstration Projects: Provide demonstration for techniques and credit for providing demonstration projects. Look at regional opportunities to implement LID within existing conditions. Need for test projects and demonstration projects

6-Costs: Tough time believing LID is less costly plus you still have the excavation and maintenance costs. Costs. Initially LID design will cost more, but as we become more familiar with it, costs will go down.

0-Develop regional demonstration projects and a long-term study.

0-Cost benefit.

0-Jumping on a fad. There are too many unknowns.

0-Potential to use stream restoration instead of ponds

0-Help with review.

0-Porous pavement is more expensive and harder to maintain.

0-Grass swales are good in subdivisions, but localities need to change their code requirements.

0-Concern over responsibility of mitigating failures.

0-Set up financial assurances (bonds)

0- Need a more encompassing approach.

0-No control over property owners' choice of contractor to create LID.

0-Start in early process of development. Mandates. Locality willing to accept an incentive upfront to take risk.

0- Long-term maintenance. Numbers of complaints or problems.

0-Enforcement.

0-Lack of education of public- buyers don't know their responsibilities.

0-Solution on regional basis- "opt out" by paying fee.

0-Cost to developer.

0-Solutions- public education, brochures at time of sale and marketing (environmentally friendly development).

0-Still need to meet water quality and quantity requirements. Need to understand of design practices that can be used.

0-Site specifics prepared by developer but if he determines conventional practices are better, need flexibility.

0-Who will determine if LID is feasible or not a site.

0-Need to change CBPA requirements so you can disturb the first 50 feet.

0-DEQ/Corps need to add LID into guidance. Incentives will help. Mandates will make it fully acceptable. Need technical guidance and LID manual for VA.

0-Agencies need to frequently update standard.

0-Will locality have easements to maintain or will the maintenance be subcontracted?

59- Need for public facilities manual: Need zoning ordinances, VDOT, local government design standards and procedures for integrating LID into required storm water management requirement, by-right. Need for precise technical guidelines for developers. Need better guidance siting conditions and make easy to use manual (i.e. tabular form). How do we implement these practices? – too subjective. How will LID be integrated into locality standards, need to adjust the public facilities manual for better utilization of LID (i.e. rain garden can't be on a private lot)? Need more guidance in storm water management handbook on LID approaches. Have standardized designs (models) for smaller projects.

50-Long term viability/service life: maintenance, stewardships, checks & balances, winter effects. Maintenance of LID features: sustainability, potential of failure, standards. Who has ultimate maintenance responsibility? Whose responsibility is maintenance? ...County, Homeowners Associations (i.e. replanting, etc.). Construction inspection and post construction functional inspections, who will do these? Need resources and funding. Long term maintenance for common areas would be HOA? Concern with LID failure due to property owner neglect or deliberate destruction. Limits homeowner – what can be done on private property (landscaping changes, additions, etc.)? Uncertainty of long-term performance. Concerned with the longevity of LID practices.

41-Changing local codes & ordinances: How do we bring local, state, and federal requirements together? Ensuring that conflicts with existing codes are resolved

33- Education strategy, hybrid approaches/introducing retrofitting gradual introduction of LID: Education/training of all involved will be critical and how to best do this. Ongoing education to: homeowners, developers, contractors, schools, permitting communities, engineers, and site designers. Need publication on how to do calculations for design purposes (time concentration through various media). Public education from the Corps – outreach from all levels of government, citizens, sierra club, etc. Public education (designers, HOA, building industry, landscapers, citizens with LID practices in yards). Educating counties on LID benefits. What criteria will be used to determine run off: *what extent/how many tests needed to be LID compliant? *extent of site assessments? *adding cost? Need coordinated effort for education/research. Training track and educational track. Special requirements for contractors, inspectors, consultants to design/construct LID.

27-Incentives: Revise USACE/DEQ regulations so LID can be counted as mitigation, especially stream impacts. Incentives to retrofit: mitigation credit, tax (property) breaks, grassroots incentives, and public pushing government/developers. Need for tangible incentives for developers/landowners. Basis for determining credits, how to quantify BMP, detention. Who will take incentives or mandates to get LID off the ground? Local government needs to provide incentives –tax write off? Allow offsite retrofits for

mitigation. LID as stream channel mitigation. Overcoming “disincentive” of integrating LID at early zoning stage/site design. Will there be incentives for existing or new development to add LID measures – rain barrels, etc.? Incentive for localities to adopt LID policy/guidance.

25-Relation to 2 and 10-year stormwater requirements: Would Corps be actually reviewing storm water management plans, how would this jive/conflict with local and state requirements? LID measures don’t provide much run-off control for larger storms. What do you do with storm water management while you are removing the original sediment basin/during lapse in conversion process? Defining minimal hydrograph requirement (what size storm event, etc.). How will LID meet state storm water management requirements? Consider LID in regional pond programs. Reconcile MS-19 with LID approach and local flood control ordinances: conflict with locality requirements.

23-Change mindset from project conception to completion.

22-Consistency: Resolve inconsistency among Corps field offices/staff with making LID a requirement. -Concerned with conflicting agency requirements/timelines for review. Changing current language in municipal guidance/regulations so LID not requiring an exception. Review time an issue – need more standards. How to bridge from standardized designs to site specific or more “creative” designs (is there an expedited review for LID? Coordination between state agencies on LID, who does the county go to for standards (who’s the first point of contact)?

17- Encourage LID in linear projects (VDOT): Possible obstacle. VDOT requirements for Curb & Gutter/sidewalks, design exceptions.

14- Easements to protect LID features: rain gardens, swales, etc., record on homeowner’s plat-deed not on separate plat, disclosure statement during real estate transaction.

9-Allow underground detention on residential lots under rain gardens.

8-Assistance to localities: case studies, staff training, and i.e. understand goals.

8-State needs to come up with standards & specifications/revise DCR’s BMP manual.

7-Need landscape/ecological (holistic) approach – more emphasis on conservation.

7 -Tell long-term benefits, more monitoring, and more case studies of long-term benefits.

5 – What is the relationship of this effort to that of the state LID taskforce?

5 – Local leadership awareness: planning commission, Board of Supervisors.

5 – Set a time limit for: training, implementation, transition from “old” to “new”.

5 – Same criteria should be in place for LID as conventional storm water management.

4 – Integrate LID in public facilities: will be examples of implementation.
4 – LID guidelines should be reviewed periodically to ensure fairness by both private and public sector.

3 – Training/certification needed for contractors and county inspectors.
3 – Anytime water is collected, there is a public outcry objection (West Nile Virus), what's the definition of "temporary ponding"?
3 – Need to develop inspection criteria (frequency, general standards).
3 – Need to deal with conflicting priorities (ADA, etc.).
3 – Clear policies.
3 – Cumulative benefit to installing LID techniques in urbanized areas, even when streams are naturally stabilized.

2 – Need more technical information, site-wide functionality & hydrological assumptions.
2 – Planning/zoning/engineering elements should be individually targeted to bridge these disciplines in the development of zoning ordinance regulations.
2 – Uncertainty with design /review costs – need predictability.
2 – Interrelationship watershed/sub-watershed development to LID (cumulative impacts).

1 – Concerns with calculation procedures with hybrid approach, especially with larger storms, how will this be implemented?
1 – Would Corps require LID as part of the alternative analysis?
1 – Heightened emphasis and look for opportunities for retrofits,
1 – COE: finance pilot projects, finance more research and disseminate results
1 – LID web page: each locality,
1 – Standards need to be set for failure, construction, and storm events.
1 – VESCH manual needs to state standards/alternatives to show how typical controls convert to LID.
1 – Reduce runoffs and retrofits.
1 – Encourage more innovative technologies.
1 – Review/reconsider zoning regulations vis-à-vis LID (buffer areas).
1 – County regulation of private property (taking away right to develop site).
1 – Ensuring compatibility of plantings –which supercedes the other (require buffers, setback, etc.).
1 – VDOT needs to agree with whatever guidance is developed.
1 – Retrofitting old developments for LID.
1 – Ranking system of areas to benefit most.
1 – considering partial/hybrid LID approaches.
1 – Move beyond suggesting need for....
1 – "Common ground", standardization: application review time, changing codes and ordinances.

0 – LID may conflict with smart growth concepts (clustering vs. scattering)
0 – Could LID cause health concerns (septic well)

- 0 – What will costs be for maintenance and would there be support to help with maintenance (especially residential) – perhaps spread across HOA
- 0 – How to get “buy in” from development community and residents
- 0 – Need for inspection standards
- 0 – Post construction inspection standards and required resources
- 0 – Distributed pattern conflicts with traditional landscape design
- 0 – Will there be criteria provided for when LID is not appropriate (i.e. lots are too small)?
- 0 – LID as an option to meet other requirements: VPDES, CBLAD
- 0 – Address developer “buy in”
- 0 – Storm water management utility
- 0 – LID address in various geological conditions: clay, Karst, etc.
- 0 – Who will be responsible for ongoing education and updating standards according to research and disclosure needs to be given to future homeowners
- 0 – If you (county) accept these LID practices, they need to be bonded and maintenance transferred to a private entity
- 0 – Limited suppliers, lack of availability of materials
- 0 – Location of facility should be on common areas
- 0 – What is the enforcement per lot?
- 0 – Easements (deed restrictions)?
- 0 – Keeping drainage “day lighted” may affect the yield – number of units/acres
- 0 – Local resistance to clustering and higher density
- 0 – Give more credit to open space than currently provided
- 0 – Where do you place utilities?
- 0 – Where will we be allowed to install LID measures? issues of adding sheds, decks, etc.
- 0 – State guidelines are too vague – need maximum and minimum ranges for all decisions
- 0 – State-mandates/COE restrictions without funding
- 0 – Consider size of commercial lot – cost to make compliant
- 0 – May consider performance criteria rather than standardized design
- 0 – Use of waivers as incentives
- 0 – Taking homeowner response into consideration (up-front)
- 0 – Marketing perception among developers
- 0 – Long-term homeowner education
- 0 – Overcoming soil constraints
- 0 – Centralized information clearinghouse – web/org
- 0 – Incentives vs. regulatory
- 0 – Constructability: inspectors, knowledge of contractors, number of facilities
- 0 – Communications with VDOT regarding its road requirements (road width, grades)
- 0 – Still need to address 5 and 10 year storms since streams (urban) are already “correcting”
- 0 – Consider application of LID on a regional approach (urbanized, rural, etc.)
- 0 – Who pays for retrofit?
- 0 – Before pushing LID – need education, checks & balances, and need overall picture of how to implement.
- 0-In impaired watersheds and streams, the only option is to implement LID practices.

Incentives to developer for incorporating LID practices into development plans.

0-Clarify “pre-development” condition (pre vs. pre-pre).

0-Rectify MS-19 pre-development with LID woods in good condition.

34-Education of levels of government including the public: Tremendous effort needed to educate the agencies and the politicians. Learning the ropes could be a handicap as will getting agencies to accept it. Finding contractors to deal with small scale. Need developers onboard with LID from the beginning. Educational outreach with municipalities and developers. Expectations to new property owners.

30-Long-term maintenance issues/LID life expectancies: Enforcement aspects (State, local, federal) and increased cost, labor, etc.). Need to clearly identify a party that is responsible for maintenance? Who is responsible if maintenance is not conducted? Where will LID sites be (on private property or common property or in right-of-way?) Need consistent criteria and guidelines for management and maintenance of LID facilities. Do LID practices have long-term viability (continue to do what they're designed to do)? What are the long-term effects of concentrated pollutants in planting media and need to change soil?

22-Conflict between the current stormwater management practices that focus on getting water off the site as quickly as possible vs. keeping the water onsite and managing it: Initial parameters and observations (which will drive the design and implementation). Those reviewing/approving plans should look at the assumptions and parameters used and verify. How do you account for the big storms (e.g., like the 100 year storm) with LID? Won't you have to build the ponds anyway? Design for 10-year storm. Need agreement between code requirements. Need a defined methodology for establishing baseline parameters. LID deviates too much from public works standards. Conflicts with accepted development practices (e.g., requirements for curb and gutter). Locality acceptance/understanding.

21-Incentives to use LID: Incentives to builders/developers for incorporating LID (mitigation credit). LID could be most useful in redevelopments. Incentives should be incorporated at this level too. Presently, there aren't any incentives to include LID. What are the incentives to using LID (expedited review process, flexibility in site design)? Without a regulatory requirement, LID is not likely without some kind of credit.

12-Engineering methodology calculations to determine if State (CBLAD/DCR) requirements are met: Quantifiable measures along with removal efficiencies are needed for LID. Need demonstrable benefit to the owner/public.

11-Risk of a locality not acknowledging LID as an approvable method: How much is enough? Practicability? What types of information will need to be submitted to the regulatory agencies for review (design and maintenance criteria)? Consistency among agencies and localities. May require a State mandate to obtain consideration of LID in all localities. Wants DCR to set a "line in the sand" to show what is acceptable under State law and a more specific endorsement of LID by DCR, DEQ, etc.

10-Cost (amended soil, private sector, and the design itself) and how to deal with problem soils? From the consultants' viewpoint, LID will be time-consuming and too involved with respect to the level of detail. LID is too time intensive for larger projects.

6-Develop a worksheet (haven't evaluated the proposed one) that assists in design to reduce labor and increase consistency.

5-What types of developments is LID best suited and where?

3-Consideration of LID to compensate for some lost wetland functions?

3- No legislative will to implement it.

3-Would like to see regional examples/success stories showing LID's use in Tidewater or the lower coastal plain.

3-How to introduce/incorporate LID in developments (phasing) and what if a JPA is submitted for a conventional development and has already been approved by the locality?

3-Can LID and "green space" co-exist? How to deal with conflicts? Concerns about safety, parking, etc. with narrower streets. Getting VDOT onboard with accepting narrower streets and other LID measures.

3-LID areas converting to wetlands. Issues/concerns?

3-Constructability- need specific details.

2-Underground utilities may be a limitation.

2-Construction sequencing for erosion and sedimentation and LID.

2-Drainage treated in easements and pavement.

1-Public acceptance of LID practices.

1-High groundwater table and need to address elevation for coastal plain.

0-Geotech reports-check for appropriate design for both development and assessment of design).

0-Easier to implement LID where quantities are not as big a concern vs. quality.

0-Requirements for contractors working on public projects.

0-Developers would consider upfront costs and acreage taken.

0-Certification

0-The process may be too complicated to get approved.

0-Do the agencies have the jurisdiction/authority to push a developer to use LID?

0-Does the Corps have the authority to suggest/push LID?

0-Concern that utilizing LID may add another "layer" to the review process.

0-Concerns about consistency in application between Corps field offices.

0-Concern about delay in project approval.

0-Local concerns about flooding in low-lying areas. What happens when pre-development conditions are "too wet"?

0-Changes needed in zoning and planning.

0-Reducing impervious cover-How?

0-Criteria for what qualifies as LID (quantifying measurements)

- 0-Off-site LID- Could this work?
- 0-Tighter controls of construction sequencing.
- 0-Not all sites eligible for LID so making requirements for LID will be difficult.
- 0-Need a way to quantify or an accepted practice for evaluating benefits.
- 0-Funding for initial protection lacking.
- 0-What are the impediments and how to deal with them?
- 0-Groundwater table considerations.
- 0-Difficult to make LID “pedestrian friendly”.
- 0-Has to start out with an initial LID plan.
- 0-A lot of uncertainties.

Charlottesville LID Workshop, December 10, 2003

49-Education: Contractor familiarity with LID BMPs. Need for an LID handbook like the one for erosion and sedimentation controls or stormwater management. Need more inspectors. Need specific information and guidelines. Educating local governments as to compliance and the benefits of LID. Education of landowner, interest groups, and general public. Need funding for education and research and development. Need to show public how LID works, examples. Need public outreach and education on a massive effort. How to implement-education through localities.

24-Maintenance: rain gardens and bioretention. Plans and implementation and follow-up and where do the funds come from to do it? Need to maintain and inspect forever. Who is responsible? Monitoring- How to, who pays, what is the life expectancy of the systems, funds to repair when they fail. Optimistic to believe that property owners will maintain.

17-Need compliance guidelines for developers and design specifications.

15- Localities must approve projects incorporating LID in a timely manner.

12- Design criteria and construction details for LID.

12- Need flexibility in local development ordinances.

11-How to change State erosion and sedimentation control law/ programs; fee structure.

8-Dealing with existing local codes (e.g., curb and gutter, stormwater ponds)

8-Lack of State water quality mandated water quality legislation (surrounding states seem to have some form of water quality regulations for erosion and sedimentation).

8-Create incentives at State and local level to get developers to do LID.

6-Past history of failures and successes; little documentation.

6-Groundwater recharge.

5-Lack of good soils. How to deal with soils (cost?)

4-Need objective performance standards outlining the level of treatment expected.

4-Guidelines for testing soil.

4-Need centralized location for organized information on engineering calculations.

4-Will regulatory agencies accept LID for mitigation? (could be good).

4-Additional consulting evaluation.

4-Topographic constraints in mountains and valleys. LID will work better in the coastal plain vs. the mountains.

4-Flexibility for development (more options).

3-Can you meet MS-19 requirements if you use LID practices?
3-Measurable pollutant removal.
3-Fits with TMDL, Clean Water Act, Natural Resource Mandates, and water quality goals.
3-Better use of resources and land than with centralized ponds.
3-Recognize differences between LID and ditches (stormwater issues and infiltration vs. conveyance)

2-Will conventional stormwater management get approved?
2-Equalization of flows.
2-Construction sequence.
2-Include a section in the State erosion and sedimentation handbook on LID.
2-Change- Unfamiliarity and uncertainty-need to adapt to a new paradigm.

1-“green” marketability
1-Acceptance by developers.
1-LID seems to be better able to handle the less than 2 year storm.
1-What to do if it fails. Where does overflow go?
1-Less yard to mow with LID.
1-How does the VA Dept of Health feel about these practices in proximity to private water supplies/septic systems.
1-Aesthetically pleasing.
1-Complexity in construction practices, i.e. labor, equipment, inspections, etc.

0-Pollution reduction with groundwater.
0-Increase in diversity-land value increases.
0-Vector control.
0-If not maintained, LID will be aesthetically unacceptable
0-Acceptance by downstream property owners.
0-Lack of homeowner associations.
0-LID poses less liability than stormwater management ponds.
0-How do you get a quantity ??? in C and D soils?
0-Vegetation can look good.
0-Curb and gutter aesthetics considered neater.
0-Drainfields in developments- conflicts between domestic waste and stormwater management.
0-Learning curves-design that locality will accept and maintenance issues.
0-Karst topography
0-Wildlife attraction (undesirable mosquitoes).
0-Can LID be quantified so it is approvable?
0-Speculative development-developer builds in infrastructure but not lots.
0-Snow removal- lot of folks don't want more impediments to plowing.
0-Curb and gutter ordinances.
0-How do you adapt for different soils, topography, and unacceptable conditions.
0-Two different sediment and erosion standards.
0-Construction vs. post-construction.

0-No standards.

0-Don't know exactly where house will be located, who's responsible?

0-Need visible examples of LID sites on the ground in the community (for example, State or Federal projects that implemented LID, or a development that used LID)

Roanoke LID Workshop, December 11, 2003

20-Quantifiable design and review standards are needed: Similar to existing stormwater and erosion and sedimentation control handbook to address how much is enough. “Owners Manual” for LID measures including plants, soil types and maintenance. Construction details are needed. As-built certification of LID construction for final approval. Incorporate LID into responsible land disturbance certification program. LID standards for development projects through a methodology, ordinance and the procedures to follow.

12-Maintenance: responsibility for off-site sedimentation costs from construction. Maintain an inventory of LID measures in place and who is responsible for maintenance. Need a maintenance responsibility outline for LID measures from construction/installation through their lifetime. What happens in the event of failure? What is the possibility of replacement?

7-Cross lot drainage and cumulative impacts and a long-term concern over shared responsibilities.

6-Awareness/education/outreach: Agency education to facilitate design review by those agencies. More coordination with various parties needed for LID and education.
6-Correct installation by contractors and need for regulatory inspections.

5-LID approach needed for mountainous region to address slope, karst soil.
5-Need to tie LID to green infrastructure.

4-Regional applicability & feasibility of LID in Southwest Virginia soils and topography. Need a pilot project in the region to demonstrate this rather than use Northern Virginia examples.

1-Funding options- construction (developer, public-private partnerships) and operation and maintenance (leave with homeowners association or private owners, public funding with general or utility money)

1-LID encourages individual responsibility and stewardship.

1-Potential increase in maintenance.

1-LID can improve stream ecology, base flow, and groundwater recharge.

1-LID treats stormwater as a resource.

1-Concern that the burden is being shifted from developers to homeowners (negative).

1-Merging construction sedimentation standards with long-term LID measures.

0-Awareness/education/outreach is a necessary first step to include pilot projects in Southwest Virginia. Need to develop standards, need to convince developers and the public, promote agency understanding of concept from the beginning of project design

stage, and a cost evaluation and funding. Target contractors and developers in education workshops.

0-Need guidance on the correct installation of LID measures including detailed inspection at designated intervals.

0-Effectiveness greater on individual lots.

0-Cost effectiveness for initial development.

0-Initial cost effectiveness or ordinance requirement in order to implement LID.

0-Time lag in design and in public support.

0-Incentive to initiate LID efforts.

0-Easier to implement for a business than for a residential site.

0-Tracking through property sales.

0-Common area installation rather than private lots as easier to manage/install.

0-Agencies need to provide incentives to promote incorporation of LID.

0-Specialized/intensive inspections at designated intervals to insure correct installation.